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APHILANTHOPS QUADRINOTATUS ASHMEAD, A WASP WHICH CARRIES HER PREY ON HER STING.

BY CHARLES H. HICKS,

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The Peckhams in "Wasps Social anl Solitary" state that (p. 76) "Ashmead quotes from Fabre the remarkable statement that *Oxybelus* carries her flies home impaled on her sting, an idea that probably arose from the fact that nearly the whole of the fly is visible." The species they studied, *O. quadrinotatus*, carried its flies one at a time, upside down head tightly clasped with its third pair of legs, and all of the abdomen projecting beyond the abdomen of the wasp.

Another instance of a wasp, this time *Aphilanthops quadrinotatus* Ashmead[1], carrying its prey on its sting was observed on September 9, 1926 and very many times on following days, near Owen's Lake some 6 miles east of Boulder. While observing *Odynerus dorsalis* Fabr.[2] nesting, a wasp which appeared to be carrying something alighted on the sand near. The first impression was that it was carrying something extending behind or beyond the abdomen. During the next few minutes I had an opportunity of witnessing the general method and place of holding the object many times as the wasp alighted on the ground and searched for her nest. The object was an ant, a worker of *Pogonomyrmex occidentalis* Cresson,[3] held upside down, head towards head of wasp, abdomen extending beyond abdomen of wasp and held by the sting of the wasp attached to some part of the thorax of the ant. It was thought that the last abdominal plates might have assisted in holding it, but on examination at the laboratory they did not appear modified for the purpose. Further study will be made in an attempt to learn just how this is accomplished. The legs were assisting in no part for all six were observed on the ground, far from contact with the ant, both when the wasp was resting or walking. The ant was a rather small load and the wasp flew or walked with it readily. It was held until taken in the net, at which time the wasp released it.

Further observations were made on succeeding days when this peculiar habit was observed a great number of times. The following extract is from field notes taken near the same locality:

On September 13, 1926, *A. quadrinotatus* was seen to enter a hole in the sand carrying in an ant. She stayed in but a few seconds after which on leaving, I pushed the sand into the hole so that the entrance was closed. The wasp returned, in about a minute, with another ant on her sting. She came to the place where the hole had been, but not finding it walked about, hunting for it. She entered a hole near, after first inspecting it from the outside for a few seconds. She stayed within for a short time, came out, then went in a second time for 10 seconds. She soon came out and began digging into her own nest. The fore

1.—Compared with determined specimen in collection of University of Colorado.
2.—Compared with specimen determined by Mr. S. A. Rohwer.
3.—Determined by Professor T. D. A. Cockerell.

legs were used for this digging and the dirt kicked back between the other two pairs which were somewhat outspread.

The following time notes were recorded after she continued carrying ants again and was working as before:

Arrives at nest with ant.	Leaves for prey.
12:31′ 30″	12:32.
12:34′ 15″	12:34′ 31″.
12:37′ 20″	12:37′ 35″.
12:40′ 16″	12:40′ 30″.
12:42′ 17″	12:42′ 50″.

Other observations agreed very closely with the above although there were sometimes rather long periods during which the wasp apparently did not work. She seemed to be busiest at the middle of the day. A single wasp worked at a given nest and all evidence points to mass provisioning.

About the first of September Aphilanthops was first observed digging and my notes point to this month as the active nesting period. It is not known if there is an earlier brood. The wasp has not been found digging in other than sandy places. She kicks the sand back in a rapid and almost continuous fashion. One was seen to kick the dirt 40 mm. high and 60 mm. away from the hole. The fore legs were used in this and the sand kicked beneath and between the outspread mid and hind legs. The abdomen was somewhat elevated and the alternate raising and lowering of the anterior part of the body together with the stream of sand thrown out behind was interesting to observe.

In a couple of instances an ant brought by Aphilanthops was taken from the wasp and placed near the entrance to see if she would use it again. The wasps repeatedly passed by without paying any attention to the ants.

A few times a wasp was seen to stop on the ground, twist her head back to the attacked ant and appear to bite it. Attempts to observe her action failed and what she actually did to the ant was not learned.

Many mounds of *Pogonomyrmex* ants were in this territory, some but a few feet away and although they were watched and the wasp followed (these attempts were always unsuccessful) she was not seen to capture the prey.

A few nests were dug out at the time but due to the dry and sandy nature of the soil the tunnels could not be followed in most cases. One tunnel measured 150 mm. in length. Some 20 mm. below the surface it branched; one going down; the other curving upwards. After twisting about these two branches met and the single tunnel continued for a short distance. Ten ants were found in a cell at the end of the tunnel.

A small area of the extensive nesting site of Aphilanthops [illegible] since been dug out with the following notes taken on depths of cells and the type of cocoon found. The depth of the cells varied from 33 mm. to 174 mm.; often three or four cells would be found so close to one another that it seemed very probable that they belonged to one nest.

All the cells of this wasp were found in nearly pure sand. The nests were on the south side of small mounds where there were strata of different soils, sands, rubbish, etc., Aphilanthops tunneled through these strata storing the ants

in sand. A number of cells were found in which there were no young, the ants being found more or less covered with mold. The number of ants to a cell varied from 8 to 12. In the cells in which cocoons were found fragments of ants were always lying beneath the cocoon of the larva. The cocoon is attached at the base and extends freely in a cavity about twice its size. The position varied although in general it tended to be more upright than horizontal.

In five square feet of surface, dug to an average depth of eight inches, forty-five cells of Aphilanthops were found containing moldy ants or cocoons of the wasp. Twenty four cells contained cocoons, three of which had been destroyed by mold. Twenty one cells contained moldy ants which had apparently not been touched by any larva. The ratio of twenty one to twenty four is high, but probably is not constant for the twenty one may represent the cells of more than one generation while the cocoons probably represent but one.

No cell was found to contain fly parasites or any other visible parasites, although some may later emerge from the cocoons. Many other cells of bees and wasps were found in these same five square feet of ground.

The cocoon is thin, light brown or sand color, club shaped with a narrow, dark end attached to the bottom of the cell. Measurements of 10 cocoons give the following dimensions: Total length of cocoon including basal portion, average 12.15 mm., minimum 11 mm., maximum 13 mm.; basal portion which consists partially of sand, debris and feces, average length 2.8 mm., minimum 2.5 mm., maximum 3 mm.; upper portion which consists of the thin, paper-like cocoon proper, average length 9.35 mm., minimum 9 mm., maximum 10 mm.; width at base of cocoon proper, average 1.71 mm., minimum 1.2 mm., maximum 2 mm.; width of cocoon at widest dimension (gradually widens until reaches maximum width very near anterior end), average 2.91 mm., minimum 2.3 mm., maximum 3.8 mm.

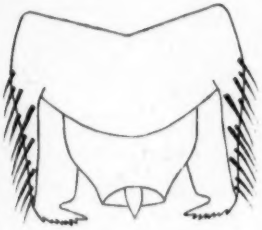
The larva, about 7 mm. long, is light yellow and normally has head towards anterior end of cocoon with the head and first two segments bent somewhat ventrally. When removed from the cocoon it will move some by twisting its body or by moving its head from side to side.

All the ants found and examined from the nests of *A. quadrinotatus* have been workers of *P. occidentalis*.

The habits of *A. frigidus* F. Smith have been studied by the Peckhams[4] and by Wheeler[5]. This species preys solely on queen ants and, according to Wheeler, probably feeds her young from day to day. Peckhams observed that the ants were carried under the body, with the legs of the wasp folded around them. They state that the ants were heavy things and ofter dropped as the wasp flew across the field. The steadiest workers brought one every forty minutes. Wheeler found *A. frigidus* nesting in colonies and using exclusively winged queens of *Formica* as prey. He says: "The wasp carries the ant under her body, supporting it by means of her middle and hind legs, while she holds its antennae in her mandibles." A very interesting account of this wasp with comparisons

4.—Peckham, G. W., and E. G., *Wasps Social and Solitary*. Houghton, Mifflin & Co., Boston and New York.

5.—Wheeler, W. M., A. Solitary Wasp (*Aphilanthops frigidus* F. Smith) that Provisions its nest with Queen Ants. Journ. Anim. Behav. 3, pp. 374-387, 1913.



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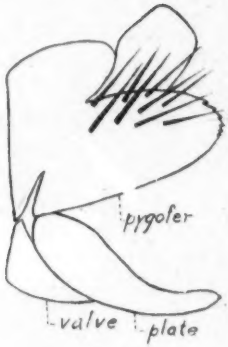

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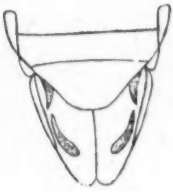

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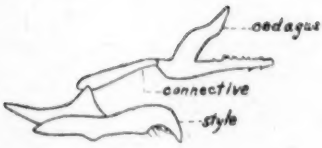

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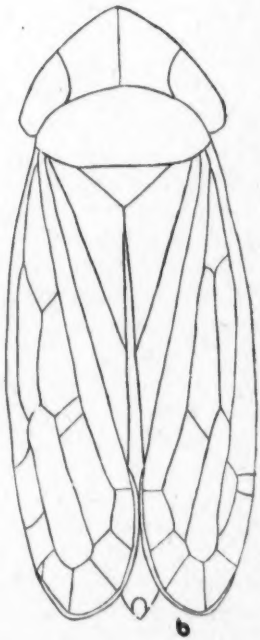

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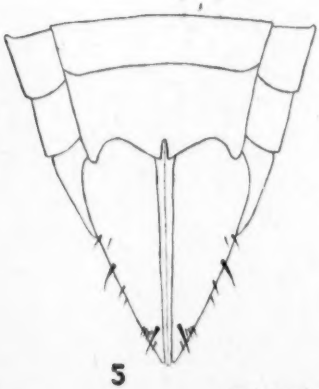

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Deltocephalus cadyi sp. nov.

1.—Dorsal view of pygofer of male. 2.—Lateral view of pygofer of male. 3.—Lateral view of internal genitalia of male. 4.—Ventral view of external genitalia of male. 5.—Ventral view of external genitalia of female. 6.—Dorsal view of female.

with habits of related forms is given in the same paper. Wheeler states that Ainslee (1909) found *Aphilanthops taurulus* Ckll. preying on ants which resembled workers of *Pogonomyrmex*. This and another species of Aphilanthops were found capturing ants, later determined by Wheeler as *P. barbatus* F. Smith, subsp. *rugosus* Emery, a variety found in New Mexico and Arizona.

A NEW SPECIES OF DELTOCEPHALUS (HOMOPTERA, CICADELLIDAE).*

BY HOWARD O. DEAY,
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Deltocephalus cadyi sp. nov.

In general appearance and coloration resembling *D. spicatus* DeLong and *D. debilis* Uhler, but with vertex much less sharply angled, and with tips of elytra slightly margined with fuscous. Length, female 3.5-3.7 mm.; male 3-3.2 mm.

Vertex much less sharply pointed than in *D. debilis* and *D. spicatus*, particularly in the male, slightly wider between the eyes at base than length at middle and slightly longer than the pronotum which is more than twice as wide as long. Elytra about as long as the abdomen in the female; distinctly longer in the male. The central anteapical cell extends beyond the adjoining anteapical cells which are rather short, especially the outer one which is frequently absent in one elytron or both.

Color: Greenish-yellow, shading to dark green, tips of elytra margined with fuscous. Vertex, pronotum, and scutellum yellow tinged with green, the male being much brighter yellow than the female. The disc of the pronotum usually darker green than the rest of the pronotum. Elytra dull green with the nervures yellow. The elytra of male much more transparent than those of female, and the nervures bright yellow. Frons of female dark with yellow arcs, clypeus and genae fuscous fading to light yellow at the margins. Frons of male deep yellow crossed by faint fuscous arcs, clypeus and genae deep yellow.

External genitalia: Last ventral segment of abdomen of female twice as long as preceding. Lateral angles prominent, rather sharply angled, posterior margin excavated on each side of a pair of median lobes which are produced as far as the lateral angles. Median incision extending about one-third the length of segment. Median lobes blackish, rest of segment yellow. Valve of male obtusely angled, posterior margin slightly rounded, twice as long as the preceding segment. Plates two and one-half times longer than valve, gradually narrowed to broadly rounded tips, equally the pygofer. There are two crescent shaped dark spots on each plate.

Holotype—Female, Big Horn Mountains, Wyoming, altitude 9,200 ft., July 27, 1925, (George Cady).

Allotype—Male, Big Horn Mountains, Wyoming, altitude 9,200 ft., July 27th, 1925, (George Cady).

Paratypes—Four male and forty-three females, Big Horn Mountains, Wyoming, July 27-31, 1925; three males and eighteen females, Yellowstone National Park, altitude 7,800 ft., August 1-7, 1925.

All types in the Snow Collection, University of Kansas.

This species named after Mr. George Cady, who collected all the specimens.

*—Contribution from the Entomological Laboratories of the University of Kansas.

NEW MICROLEPIDOPTERA FROM ONTARIO

BY ANNETTE F. BRAUN,
Cincinnati, Ohio.

Of a total of approximately one-hundred and fifty species of Microlepidoptera collected and reared by the writer in July, 1926 at Sparrow Lake, Severn Bridge, Ontario, the following seven species are described as new. Additional notes on a few previously described species are also included.

Antispila argentifera n. sp.

Face golden brown, vertex darker and concolorous with the thorax and fore wings. Antennae brown throughout. Thorax and fore wings shining dark brown; markings pure silvery white. At basal third, a slender, oblique and slightly curved fascia of almost equal width throughout; a large triangular spot at tornus and a small costal spot a little beyond; apical silvery spot very large. Underside of body and legs somewhat paler. Expanse: 5 mm.

Type (♂), Sparrow Lake, Ont., July 16, 1926.

Differing from all the other species in the entire absence of golden tints in the metallic markings, and except *A. eugeniella* Busck, the smallest American species of the genus.

I surmise that the species is a miner of birch (*Betula papyrifera*). Deserted mines of a species of *Antispila* were observed early in July, near where the moth was captured, in the young leaves of birch. A long linear mine ends in a large blotch; with the expanding of the young leaves the mine soon becomes torn and is not easily noticed. The pupal case is broadly oval.

Coleophora innotabilis n. sp.

Labial palpi white inwardly, second segment outwardly obliquely divided white and gray, third gray outwardly. Head gray, face paler, anterior row of scales on the thickened gray basal segment of antenna white, stalk dark gray, conspicuously annulate with white. Fore wings uniformly colored, gray, somewhat coarsely scaled, and hence somewhat irrorate, because of the paler bases of the scales. Hind wings concolorous with the fore wings. Underside of body and legs predominately white, dark scaling almost entirely lacking. Expanse: 14-15 mm.

Type (♂) and five paratypes (3♂, 2♀) reared from cases on *Populus balsamifera*, rarely on aspen, Sparrow Lake, Ont.

The case is of the type of *C. pruniella*, and very closely resembles the case of that species when it occurs on apple. At pupation, the case of *C. innotabilis* is always attached to the upper side of the leaf. Larvae and pupae collected from July 4 to July 15; imagoes July 11 to July 22; type July 20.

The moth is very close to *C. pruniella*, but somewhat paler with wings more coarsely scaled, hence more strongly irrorate, and with more white scales on the face and basal segment of the antenna.

Elachista inaudita n. sp.

Palpi pale brassy fuscous; antennae, head and thorax brassy brown. Fore wing in basal third brassy brown and faintly greenish, shading outwardly into dark blackish brown in the apical half, with a faint purple luster replacing the brassy luster of the base of the wing; an elongate creamy white spot in the fold before the middle; a large white spot on dorsum at the beginning of the cilia

reaching half way across the wing; a triangular somewhat curved white spot beyond this on costa. Cilia purplish black. Hind wings and cilia dark brown. Legs dark brassy fuscous, tips of tarsi paler. Abdomen brassy brown, posterior margins of segments beneath whitish. Expanse: 10 mm.

Type (♀) reared from a miner of leaves of *Scirpus* sp., Sparrow Lake, Ont.; larva July 16, imago August 6.

The larva makes a rather broad brownish mine, gradually widening and extending straight toward the tip of the leaf; probably earlier and narrower mines, not observed, are made by the younger larvae. Pupation in a slight cocoon. The pupa is of the slender elongate type, but has the median dorsal ridge very prominent, much elevated and extending forward onto the head; lateral ridges less prominent, whitish. The general color of the pupa is brownish; between the lateral ridges and dorsal ridge, but nearer to the former, is a dark brown stripe broadest on the middle abdominal segments.

A very distinct species not close to any of the described American species.

Graciliaria umbratella n. sp.

Maxillary and labial palpi golden yellow, apex of second segment of labial palpi, and entire lower side and outer half of third segment except extreme tip dark brown. Antennae dark purplish fuscous, with paler annulations. Face golden, shading to brownish purple on the head. Fore wings dark crimson purple, with some golden brown reflection; two golden costal triangles, the first large, reaching to the fold, but not beyond, and truncated on the fold, usually concave or indented on its outer side, and marked on the costa with one or two black dots; its outer edge on costa does not quite reach the middle of the costa. The second costal triangle is separated from the first by about half its width, thus lying but little beyond the middle of the wing; it is extremely small. Beyond the second triangle are three indistinct yellowish brown spots; the first small, the second nearly crossing the wing, the third at the extreme tip of the wing, partly in the cilia. Cilia brownish purple, marked with three dark lines around apex and on termen; gray on dorsum. Hind wings dark brownish gray. First and second pair of legs brownish purple, tarsi white, with dark tips; hind legs, except for the dark brown outer halves of the femora, yellow with brownish shading toward tips of segments. Underside of abdomen golden yellow. Expanse: 11 mm.

Type (♂) and three paratypes (2♂, 1♀) reared from mines and cones on sugar maple, *Acer saccharum*, Sparrow Lake, Ont. Larvae collected July 14; imagoes, July 31 (type) and August 2-5, 1926.

The short linear mine terminates in a small flat blotch, in which the parenchyma is consumed; on leaving the mine the larva makes a small cone at the tip of one of the lobes, and later a large cone by rolling under one of the lobes. In the breeding jar in every case the cocoon was spun on the outer surface of the cone in a slight fold in that part of the rolled leaf which in nature faces downward. Cocoon reddish tinged.

This species is distinguished from all the other *Acer*-feeding species with uniform ground color and sharply defined costal triangle by the dark labial palpi.

Gracilaria cornusella Ely.

Five specimens reared on *Cornus canadensis* at Sparrow Lake, Ont., differ markedly from specimens from the type material reared by Dr. Chas. R.

Ely on *Cornus stolonifera*, but are connected with the typical form by a series of intermediate forms which I have had the opportunity of examining through the kindness of Dr. Ely. In addition to two specimens of the type series, I have examined specimens reared by Dr. Ely from rolls on *Cornus alternifolia* and *Cornus candidissima* (*C. paniculata*), East River, Conn.

There is a regular progression from forms in which the first costal spot is definitely triangular (typical *cornusella*) to forms in which this mark becomes a broad parallel-sided fascia reaching the dorsum. The latter condition is shown in three of the five Ontario specimens. The *Cornus candidissima* specimens approach the Ontario series most closely in this respect. In two of the Ontario specimens there is in addition a very small golden spot at the tornus opposite the second costal triangle.

On *Cornus canadensis*, the leaves are not always rolled from side to side, but are often rolled diagonally, or even almost from the tip; the rolls are not always perfectly cylindrical, but sometimes tend toward a cornucopia form.

Gracilaria anthobaphes Meyrick.

Larva forming tentiform mine on underside of leaf of *Vaccinium;* cone formed of entire leaf; imago July 25, 1926, Sparrow Lake, Ont.

Gracilaria invariabilis n. sp.

Palpi yellow, shaded with deep brownish orange, especially on the apical segment. Face yellow, the color deepening to reddish saffron on the vertex. Basal segment of antenna and first few segments of the stalk saffron, these basal segments ringed with dark brown, remaining segments whitish, and conspicuously ringed with dark fuscous. Fore wings deep saffron with strong and brilliant crimson reflections, so that in some lights this color predominates; the wing also shows pale blue reflections. Costal edge from basal third almost to apical cilia pale yellow, without blue and crimson reflections; in some specimens just within the costal edge there is a row of very minute brown specks. Cilia saffron and crimson opposite the apex, saffron below shading to gray on dorsum. Hind wings gray, cilia brownish toward bases. Fore and middle legs rusty orange and brownish, tarsi almost pure silvery white, with minute white tips; hind legs except the femora an almost uniform pale brownish or dirty yellowish white color. Abdomen gray above, pale yellowish beneath. Expanse: 14-16 mm.

Type (♂) and eleven paratypes (2♂, 9♀) reared from larvae on *Prunus pennsylvanica*, Sparrow Lake, Ont.

Larvae collected July 4 and July 11; imagoes July 22 to August 8, the date of emergence of the type being August 8. A very indistinct whitish linear mine ends in a small underside blotch, with parenchyma consumed and epidermis somewhat wrinkled. When the mine is at the margin of the leaf, the edge is folded under. On leaving the mine, the larva forms the usual typical Gracilaria cone, rolling the leaf from the tip, with underside in. Cocoon outside the cone.

There is no variation in color or markings in the entire series. It is however almost indistinguishable from similarly colored forms of *G. alnivorella*, and only differs in the paler and more strongly iridescent blue and crimson luster of the fore wing, and the purer white fore and middle tarsi. It differs in larval habits from *G. alnivorella* in that it makes but a single and typical Gracilaria cone.

Gracilaria scutellariella Braun.

A large series of specimens reared at Sparrow Lake, Ont., on *Scutellaria galericulata* differs from the type series (reared on *S. versicolor*) in larval habits. In the Ontario series, the larva, on leaving the mine, instead of pupating at once, either forms a typical Gracilaria cone by folding the outer part of the leaf onto the upper side, then bending the extreme tip to close the cone, or folds the entire leaf edge to edge, with the upper side in. The cocoon is spun in a fold of a leaf, preferably of the food plant.

Many of these specimens also show a greater admixture of the straw color along the costal and dorsal margins, where in some instances this color predominates.

Scythris scintillifera n. sp.

Palpi deep purple, base of second segment whitish. Head and antennae deep purple bronze. Thorax and fore wings dark golden metallic, with reddish bronze reflections, and groups of dark reddish bronze scales which form ill-defined markings as follows: a streak in basal third of fold narrowly separated from a more distinct elongate spot just beyond the middle of the fold, a transverse band across the wing at seven-eights, a spot at extreme tip. Scales along termen reddish brown. Cilia dark purplish bronze. Hind wings dark brown, with faint golden reflections, thinly scaled toward base; cilia dark purplish brown. Venation: fore wing, vein 3 obsolescent; hind wing, 4 and 5 separate. Legs dark purplish brown, basal segments of legs and underside of thorax and abdomen paler, yellowish gray. Upper side of abdomen purplish, with golden scales intermingled. Expanse: 12 mm.

Type (♂), Sparrow Lake, Ont., July 13, 1926.

Nepticula procrastinella n. sp.

Tuft reddish ocherous, antennal eye-caps pale straw colored, stalk fuscous, collar pale straw colored. Thorax and basal fifth of fore wings dark blue-gray, ground color of remainder of wing dark blackish brown, with faint golden reflections and bases of scales golden brown. Beyond the middle of the wing a brilliant silvery fascia, widest on the margins and more or less constricted in the middle of the wing, especially by an indentation on its outer side. Where the dark blue base of the wing joins the outer blackish brown color, there is usually a more or less distinct irregular patch of straw-colored scales on dorsum; this patch may extend entirely across the wing, forming a rather broad irregular and somewhat dusted pale fascia, in which case the base of the wing is also minutely dusted with straw color; sometimes there is no indication whatever of pale scales in this position. Cilia gray on costa and dorsum, white around the apex. Hind wings dark gray. Legs silvery gray, shaded more or less with dark gray, tips of tarsi paler. Abdomen dark bluish fuscous above, yellowish silvery beneath. Expanse: 5-7 mm.

Type (♂) and twelve paratypes (♂ and ♀), July 12, 1926; one paratype (♀) July 16, 1926, Sparrow Lake, Ont., all taken resting on leaves of hop hornbeam, *Ostrya virginiana*, which is no doubt the food plant.

The variation in markings in this species is in general independent of sex, but the one specimen of the series showing a complete broad fascia at basal fourth is a female.

A NEW SPECIES OF DRAKELLA (HETEROPTERA-TINGITIDAE).*

BY W. DOWNES,

Victoria, B. C.

A new species of this interesting and little-known genus was recently found at Goldstream, B. C. It was a dead specimen and was found among detritus washed up on the edge of the reservoir. It is close to *D. ovata* O. & D. but differs from it in many important characters. The specimen is brachypterous.

Drakella saundersi n. sp.

Head with two short converging spines in front between the eyes, directed forward and slightly downward. Antennae slightly shorter than the head and pronotum together, rather hairy, especially on the fourth segment; the third segment more than twice the length of the fourth. Eyes coarsely granulate. Hood with three rows of areoles, triangulate, the apex reaching as far as the middle of the eyes. Paranota coarsely reticulated, with two rows of areoles, the lateral margins rounded. Pronotum finely reticulated except on the anterior third. Median carina with two areolae at the middle. Legs rather short and slightly hairy. Costal area coarsely reticulated with a single series of areoles as large as those of the paranota until near the apex where it widens with single and double areoles unevenly placed. Subcostal area of even width throughout except at the base, finely and evenly reticulated with six rows of areoles. Discoidal area with outer margins nearly straight, more coarsely reticulated than the subcostal area, with seven rows of areoles. Sutural area with one complete row and two partial rows of areoles. Entire upper surface polished and shiny. Colour rich brown, ventral surface lighter brown, highly polished. Anterior portion of the pronotum fuscous, posterior two-thirds light brown. Length 2.2 mm. Width 1.35 mm.

Holotype—1 ♀, Goldstream, B. C., July 15, 1926, (Saunders); No. 2446 in the Canadian National Collection, Ottawa.

Named in honour of Dr. L. G. Saunders who found the specimen.

Dr. Carl I. Drake has kindly compared this species with *D. ovata* and has supplied me with the following notes:

The proportional lengths of the antennal joints in the two species are as follows:

saundersi—(1)8; (2)5; (3)35; (4)15.
ovata— (1)8; (2)5; (3)28; (4)14.

In *ovata* the areolae of the discoidal, costal, and subcostal areas are about a fourth or a fifth larger. The discoidal area is differently shaped. In *ovata* it is very wide near the apex and then broadly rounded and the outer border is constricted before the middle, whereas in *saundersi* it is nearly straight and then gradually rounding before the apex. In *ovata* the subcostal area has only five rows of areoles. In *ovata* the two spines on the head are directed slightly upward, whereas in *saundersi* they are curved slightly downward. They are directed about as much *up* in *ovata* as they are *down* in *saundersi*. The latter species is more polished and shiny and the cells are more regularly arranged than in *ovata*. The outer margins of the paranota are more rounded than in *ovata*. In *ovata* the cells are larger and the whole insect has a rougher appearance.

*—Contribution from the Entomological Branch, Dept. of Agric., Ottawa.

NOTES ON THE OCCURENCE OF AEDES (OCHLEROTATUS) NEARCTICUS DYAR IN THE ROCKY MOUNTAINS PARK, ALBERTA. (CULICIDAE DIPT.)*

BY ERIC HEARLE,
Indian Head, Saskatchewan.

Aedes nearcticus Dyar.

Aedes nearcticus Dyar, Rept. Can. Arct. Exped., vol. 3, pt. C, p. 32, 1919.
Aedes parvulus Edwards, Bull. Ent. Res., vol. 3, p. 314, 1921.

One of the more interesting details of a recent investigation of the mosquitoes of the Rocky Mountains Park, Alberta, was the finding of *Aedes nearcticus* Dyar—a mosquito hitherto considered to be restricted to the Arctic regions of Europe and North America. A few specimens were first taken at Lake Louise in 1921, when Mr. Arthur Gibson, the Dominion Entomologist, and the writer made a brief survey of mosquito conditions. In 1922 further specimens came to hand through the kindness of Mr. N. B. Sanson who sent the writer living larvae collected at Simpson's Summit at about 7000 feet. Adults were successfully reared from these. During 1924 and 1925 a number of trips were made by the writer and his assistant, Mr. A. G. Mail, to secure data on this interesting species, and several hundred specimens of larvae, and both sexes of adults were taken.

The larvae of *Aedes nearcticus* are very like those of *Aedes alpinus* Linnaeus in form, but the anal segment is not ringed and the comb scales, which in most of our specimens are 12 in number, are not bare but have a few short spinules in addition to the long central thorn. The pecten has several detached teeth in the case of *Aedes alpinus* but the teeth are evenly spaced in *Aedes nearcticus*. The upper and lower head hairs are single and very delicate as in *A. alpinus*, and the antennae are of markedly uniform width throughout and show little broadening at the base or tapering towards the tip. The lateral abdominal hairs appear to be subject to considerable variation. In some specimens they are similar to those of *Aedes alpinus*—i.e., in fours on the first segment, in threes on the second and double on the remainder, but in the majority of our specimens they are triple on the first two segments, double on segments 3 and 4, and single on 5 and 6. In some cases the laterals are triple to the 4th segment. The secondaries are small with the exception of those of the first two segments, and of single long sub-lateral hairs projecting ventrally on each side of segments 3 to 5. The anal gills are very elongated, being about 3 times as long as the anal segment. *Aedes pullatus* Coquillett breeding in the same pools have similarily lengthened gills, due doubtless to the type of water.

The mesonotum of the male has an abundance of very long black hairs and an irregular and sparse scattering of short curved yellow scales. In the female the mesonotum has numerous fairly long dark coarse hairs and there is a close covering of curved narrow bronzy brown scales. There are also some yellow scales similar to those on the male—these tend to lie along the margins of the mesonotum and also to form a pair of indistinct median spots. In a few aberrant specimens these yellow scales are greatly increased in numbers and encroach over much of the centre of the mesonotum.

In the male genitalia in most of our specimens the marginal hair of the basal lobe is slightly thickened—in some cases sufficiently so as to form a weak

*—Contribution from the Entomological Branch, Dept. of Agric., Ottawa.

spine. This appears to be subject to considerable variation. There is no character of the hypopygium by which this species can be separated from *Aedes alpinus*.*

In size the majority of the Alberta specimens are very similar to those from Alaska and other places in the main northern range, but some strikingly dwarfed specimens were taken on the wing at Lake Louise in 1925. Among these were the smallest *Aedes* the writer has seen; some specimens being only 3.5 mm. in length (head to end of abdomen) with the wing 2.5 mm. Average sized individuals from Banff and Lake Louise are about 5 mm. with the wing 4 mm. A few of the Alaskan specimens examined are slightly larger than this.

As might be expected from the isolated nature of the larval habitats at high elevations, this species is very localized in the Alberta mountains. It may be dominant in one place and only occur sparsely in another, similar, location. A very typical breeding place was found in Cascade mountain amphitheatre; a cold basin of some 7300 feet elevation sheltered from the sun by high cliffs. This basin is the habitat of large numbers of such typical Hudsonian animals as the hoary marmot (*Marmota caligata* Escholtz) and the pika (*Ochotona princeps* Richardson). Here the cold-loving and supposedly rare insect *Grylloblatta campodeiformis* Walker, was found to be surprisingly common. The main vegetation consists of clumps of spruce, dwarfed willows and false heather (*Phyllodoce* spp.) At the melting of the snows in early June the main meadow becomes converted into an extensive pond, which however, is extremely evanescent. No mosquito larvae were found in this sheet of water, possibly because the pond forms and disappears within a few days. At a slightly higher elevation, and cut off by a little ridge from the main pond, is a very small shallow pool which constitutes the only water in the basin that does not drain away quickly; the bottom of the pool is grassy and the water is brownish in colour. Examinations in 1924 and 1925 showed this pool to be teeming with mosquito larvae, about 90 per cent. of which were *Aedes nearcticus*. *Aedes pullatus* occurred in the proportion of about 7 per cent, and *Theobaldia alaskaensis* Ludlow in about 3 per cent. A careful examination of several hundred larvae revealed only these three species.

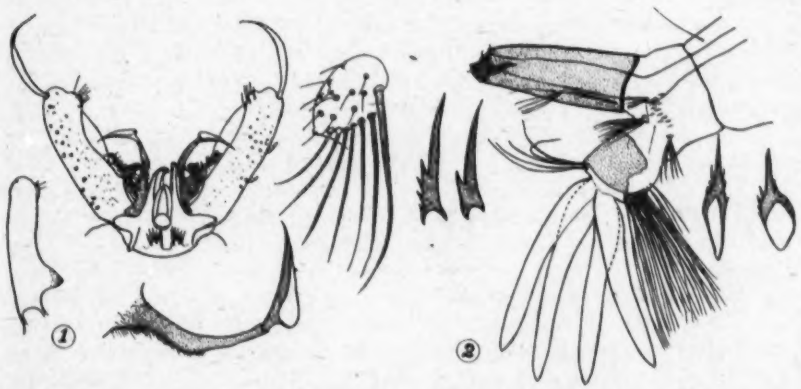
In the above pool, in 1924, nearly all the larvae had attained full growth, and a large proportion of pupae occurred by June 24th. A large number of adults from these emerged in the laboratory during the last three days of June. The pool was again examined on July 7th, and was found to still contain some pupae, but there were only a very few larvae; adults emerged from this collection shortly after the specimens were brought to the laboratory, a few, however, did not emerge until as late as July 11th.

In 1925 larvae were found to be full-grown by June 16, but few pupae were noted at this date. The majority of larvae pupated within the next two days and emergence of adults commenced on June 22nd, the main emergence occurring on June 24th. Practically all adults were out by the end of the month. A visit to Cascade basin on July 4th showed the pool to be completely dried up. A few

*—On pp. 47-49 of this volume C. R. Twinn published an article in which he unfortunately indicated that *A. nearcticus* Dyar is a synonym of *alpinus* L. The synonymy should have been given with a query. The holotype of *nearcticus* is an adult male in the Canadian National Collection and a comparison of the genitalia of the two species shows differences which may be considered as of specific value. In view of these differences it seems advisable to illustrate the characters by which the adult males may be separated and a paper with this end in view is under preparation. C. H. Curran.

adult *A. nearcticus* were noted on the wing, some coming to bite, and others resting in willow clumps.

At Lake Louise fairly extensive collections of larvae were taken and reared in 1922, 1924 and 1925. Among the pools were some in very similar situations to that at Cascade basin. While some of these produced *Aedes nearcticus* the proportions were very small, and *Aedes pullatus* was found to be dominant in pools in mountain basins, in this vicinity, at about 7000 feet elevation. *Aedes nearcticus* was the main species on the wing on June 28th, 1925, in the Lake Agnes basin, but collections of larvae taken from snow pools at that date gave only *Aedes pullatus*. Larval collections on July 3rd, 1924, gave a few *Aedes nearcticus* among much greater numbers of the other species. Snow pools at Moraine lake, at a little over 6000 feet, gave only *Aedes pullatus*, but numbers of *Aedes nearcticus* were noted on the wing. The larvae from Simpson's summit



1.—*Aedes nearcticus* Dyar, male genitalia (preparation in centre drawing slightly flattened). Portion of basal lobe with long hairs at right; normal lateral view of sidepiece at left.
2.—*Aedes nearcticus* Dyar, end of abdomen of larva, and pecten and comb scales.

were taken on June 22nd, pupated on the 23rd and produced adults on July 2nd. A number of larvae from Cascade basin which were reared in isolation, pupated on June 27th, 1924, and produced adults from 5 to 7 days later. Abraded adult females of what appear to be this species were noted in the Cascade basin as late as the end of August, but their condition does not allow of a definite diagnosis, as *Aedes cataphylla* Dyar is very hard to distinguish from *Aedes nearcticus*, in specimens that are not fresh.

While we have no definite records of this species from British Columbia, it is certain to occur where Arctic-Alpine conditions obtain; and the writer has indirect evidence from the graphic descriptions given by various trappers and others frequenting high elevations, who were close observers of insect life.

It was thought that *Aedes alpinus*, the other species co-inhabiting the far northern range of *Aedes nearcticus*, and also possibly the Alaskan *Aedes punctodes* Dyar, might be found at high elevations in the Rocky mountains, in addition to the species under discussion, but there is no indication of them in the material so far examined.

NOTES ON CERTAIN AGROTID GENERA AND SPECIES (LEPID.).*

BY J. McDUNNOUGH,
Ottawa, Ont.

In connection with a revision of Agrotid genera (*in sens. strict.*) which I have been working on for some time and which has involved a study of the male genitalia of all our North American species, I have come across a number of discrepancies in the placing of certain genera and species which it is the purpose of this short paper to correct.

Genus *Rhizagrotis* Sm., 1890, Bull. 38, U.S.N.M., 10, (Orthotype, *cloanthoides* Grt.).

This genus, which must be restricted to the two species *cloanthoides* Grt. and *albalis* Grt. is not Agrotid, according to genitalia, but will fall into the Acronictinae somewhere near *Andropolia*, The spining of the tibiae, which has led to the incorrect association with the Agrotids, is not at all typical of this subfamily. The hind tibiae are unspined, the mid-tibiae possess a single row of claw-like spines on the outer side, and the fore tibiae show a more or less complete row of claw-like spines on the outer side but only apical spines on the inner side, this spining varying in the two species. In Agrotids it is the spining on the inner side of the fore tibiae which persists longest, that of the outer side being replaced by hair-tufts. The other species included under *Rhizagrotis* are Agrotid and will fall into various groups which I will discuss in my complete paper.

Genus *Adita* Grt., 1874, Bull. Buff. Soc. Nat. Sci., II, 64, (Orthotype *chionanthi* A. & S.).

The genus is best placed in the Cuculliinae near *Oncocnemis;* the genitalia clearly indicate this reference and the lashed eyes, apical claw on fore tibia and general appearance bear this out. Grote, in his 1895 List, also made this association (p. 39).

Genus *Apharetra* Grote, 1901, Proc. Ent. Soc. Wash., IV, 368, (Orthotype, *dentata* Grt.).

Placed originally following *Acronicta* it was transferred to the Agrotinae by Hampson (Cat. Lep. Phal., IV, 666c) on the strength of a few spines on the distal portion of the mid and hind tibiae. The genitalia of *pyralis* Sm., which may be merely a race of *dentata*, indicate that a reference of the genus to the Cuculliinae is warranted; the lashed eyes in this case are apparently of more value in determining the correct association than the odd spine or two. It would fall into the *Oncocnemis* group.

Genus *Anytus* Grote, 1873, Bull. Buff. Soc. Nat. Sci., I, 144 (includes *sculptus* Grt. & *capax* G. & R.)

1874, op cit., II, 27 (*sculptus* Grt. = *privatus* Wlk., designated as type).

The genitalia bear out Grote's reference of the genus to the Cuculliinae or at least show a very close relationship to the *Eumichtis* group; the genotype is certainly not Agrotid. Smith figures the genitalia of *privatus* and of the other so-called species which are congeneric in a paper on the species of Anytus (1910, Psyche, xvii, 206, Pl. II); I have only studied the genitalia of *privatus* Wlk. and *obscurus* Sm. and these show nothing to indicate specific distinction.

Genus *Fishia* Grt., 1877, Can. Ent., ix, 21, (Orthotype, *enthea* Grt.)

On genitalia the genus seems distinct from *Anytus* but should certainly be placed next it; it will include the other species at present listed under *Anytus*.

Genus *Protagrotis* Hamp., 1903, Cat. Lep. Phal., IV, 655 (Orthotype, *viralis* Grt. = *niveivenosa* Grt.)

Falls, on genitalia, into the Acronictinae near *Sidemia* and *Luperina*, a re-

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

ference corroberated by the general habitus. I have had no opportunity of examining the genitalia of *nichollae* Hamp. but the other species, including *extensa* Sm. are congeneric.

Genus *Metalepsis* Grt., 1875, Check List Noct., 25 (Orthotype, *cornuta* Grt.).

This genus can only be distinguished from the European *Cerastis* Ochs. (type *rubricosa* Schiff.) by the presence of spines on the fore tibiae; the male genitalia of the two genotypes are practically identical. Along with *cornuta*, *fishi* Grt. and *salicarum* Wlk., now included in *Epipsilia* Hbn., should be placed. *Matuta* Grt. (Orthotype, *catherina* Grt. = *tenebrifera* Wlk.) will apparently fall to *Cerastis* Ochs., the genitalia showing the same spinose flaps on the *anellus* (vide Pierce, Genit. Brit. Noct., Pl. xix), although less strongly developed than in either *rubricosa* or *cornuta*. The other species included in the 1917 Check List under *Matuta* are misplaced and will be discussed in the complete revision.

Genus *Pseudoglaea* Grt., 1876, Can. Ent., viii, 18 (includes *blanda* Grt. & *taedata* Grt. = *blanda*).

This generic name must be resurrected for *olivata* Harv. (*blanda* Grt.), *Mythimna* Ochs. being non-Agrotid, owing to Duponchel's designation of *albipuncta* Schiff. as genotype in 1829; Hubner's restriction in the Verzeichniss is of no value under the International rules. In any case the claw-like spines on the first joint of the foretarsus are probably sufficient to validate the generic name.

Mesogona Bdv. (genotype *acetosellae* Schiff.) is extremely close but the tarsal claws are less developed.

Genus *Lampra* Hbn., 1822, Verz. 221, (Orthotype, *fimbria* Linn.).

I cannot agree with Benjamin (1921, Bull. S. Calif. Acad. Sci., XX, Pt. 3) in using this generic name for our North American species formerly placed under *Rhynchagrotis* Sm. Apart from the totally different superficial appearance of *fimbria* we have the structural differences noted by Benjamin (op. cit. p. 74) and the added and most significant feature of entirely different male genitalia. On this latter feature *Lampra fimbria* shows much closer relationship to the *unicolor-havilae* group (Genus *Spaelotis* Bdv.) than to the species listed in the revision. For the majority of these species the generic name *Abagrotis* Sm. is available whilst *Rhynchagrotis* Sm. may possibly only apply to the *cupida* group. Incidentally it might be noted that *nanalis* Grt. falls here; the foretibiae are unspined and the genitalia are quite typical.

Genus *Euxoa* Hbn., 1822, Verz., 209. (type designated as *decora* Schiff. by Hampson (1903)).

In some of his latest papers Benjamin (*vide* Can. Ent., 1926, lviii, 303) has been using the generic term *Agrotis* (type *segetum* Schiff.) to replace *Euxoa* Hbn. I believe that this usage is scarcely justified; the types of genitalia of the two genotypes certainly do not point to any very close relationship. *Euxoa*, with its bifid harpe—or rather with a curved harpe attached more or less at right angles to the sacculus which is produced to a long free arm—has little in common genitalically with *Agrotis* where the harpe is a single slightly recurved corneous hook, lying more or less parallel to the plane of the clasper; this and other points indicate to my mind a different origin for the two generic concepts, an opinion which apparently is also shared by Dr. Corti in his excellent papers on European Agrotids. On the other hand *Porosagrotis* Sm. (genotype *vestusta* Walk.) seems absolutely congeneric with *Agrotis* if we except the differences in male antennae which in the Agrotids are certainly of little generic value; *Feltia* Wlk.

(type *ducens* Wlk.) is also very close but the term may possibly be saved for the *ducens* group, based on minor differences of genitalic structure and the smooth front, as compared with the generally roughened and tuberculate front of *Agrotis;* certainly most of the Feltias of the 1917 Check List are typical Agrotids. While on the subject of the front I might note that the roughened or tuberculate front as compared with the smooth one is of little generic value; *ypsilon* Rott., a typical *Agrotis* by genitalia, has a smooth front, whilst in all the other North American species which I place in this genus the front is roughened in a varying degree. In *Euxoa* the front is normally tuberculate but in *detersa* Wlk. and *quebecensis* Sm. the tubercle is obsolescent and in the three species at present listed as *Agrotis violaris* G. & R., *Agrotis aurulenta* Grt. and *Lycophotia scandens* Riley the front is smooth, although the genitalia are Euxoa-like; these three species should certainly be transferred to *Euxoa*. Benjamin's usage (l.c. 306) of *Triphaena* Ochs. (type *pronuba* L.) in place of *Agrotis* of Hampson is not a very fortunate choice; I doubt very much if we have any species in North America congeneric with *pronuba* which has extraordinary genitalia (vide Pierce, Gen. Brit. Noct. Pl. xv). As a matter of fact our species under *Agrotis* (according to the Check List) will fall into several groups; for some of these *Graphiphora* Ochs. (type *c-nigrum* L.), not *Graphiphora* Hbn. of the Tentamen (which I do not employ, following Opinion 97 of the Committee on International Nomenclature), and *Diarsia* Hbn. (type *dahlii* Hbn.) are available.

Genus *Eurois* Hbn., 1822, Verz. 27 (used for *herbida, tullia, speciosa, occulta* & three others). Grote, 1874, Bull. Buff. Soc. N. Sci., II, 12 (designates *occulta* as type).

Hampson's usage of this generic term with *prasina* (*herbida*) as genotype is *ultra vires* in view of Grote's designation. The genus will include the North American species *occulta* Linn., *astricta* Morr. and *nigra* Sm. For *astricta* Benjamin (op. cit. 307) has recently used *Caradrina* Ochs. but although I agree that the genus must be considered as Agrotid, owing to Duponchel's unfortunate type designation in 1829, I cannot believe that the genotype, *i-intactum* Hbn., is congeneric with the above mentioned three species.

NEW OR LITTLE-KNOWN NEARCTIC SPECIES OF TRICHOCERIDAE (DIPTERA.)

PART I.

BY CHARLES P. ALEXANDER,

Amherst, Massachusetts.*

The North American species of Trichoceridae belong to three genera, *Diazosma* Bergroth (*subsinuata* Alexander), *Paracladura* Brunetti (*trichoptera* Osten Sacken) and the dominant *Trichocera* Meigen, with numerous species, some of which are widely distributed throughout the Holarctic Region. The scope of the family, its phylogenetic relationships, and a key to the known genera, are all discussed in a recent paper by the writer. (The Trichoceridae of Australia; *Proc. Linnean Soc. N. S. W.*, 51: 299—304; 1926) and need not be considered further at this time.

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*—Contribution from the Department of Entomology, Massachusetts Agricultural College.

The material discussed at this time is in part preserved in the writer's collection, in part in the National Collections of the United States and Canada. I am greatly indebted to the Custodians of the Diptera of these Collections, Dr. Aldrich and Mr. Curran, for the privilege of studying these series. I am also indebted to Messrs. Garrett and Salman for the gift of additional material considered at this time.

The terminology of the venation adopted herein is about as used by the writer in recent papers, with some important changes in the radial field that are being discussed in an extensive paper on this subject. (The interpretation of the radial field of the wing in the Nematocerous Diptera, with special reference to the Tipulidae. *Proc. Linnean Soc. N.S.W.*, in press). The application was stated for the Pediciine Tipulidae (*Ent. News*, 29: 201-205, pl.; 1918) but had not been carried through all the groups of Tipulidae and the phylogenetically higher Diptera. This modification, as it regards the Trichoceridae, may be briefly stated as follows:

The key to this problem was found in certain generalized types of Pediciine crane-flies which are not strikingly different from the Tanyderidae. There are two distinct tendencies of specialization in this field of the wing, the first of which has been termed "the cephalization of vein R_2." The anterior branch (R_2) of the upper fork of the sector (R_{2+3}) has swung cephalad and fused with vein R_1 for a short to longer distance back from the wing-margin and has thence gradually assumed a transverse position. It is this element, the basal section of R_2, that has been called the radial crossvein (r) in all groups of Diptera where it occurs. As has been discussed in detail in the paper cited, the radial crossvein in Diptera has *never* assumed a *transverse* position, in the few groups where it has been developed (as Tipulinae, Cylindrotominae) always occupying a longitudinal or oblique position. The confusion that has existed and the indiscriminate calling by a single term of two distinct elements of this field will become apparent to anyone who will undertake to critically analyze the situation.

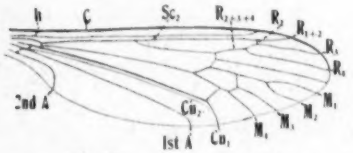

Fig. 1

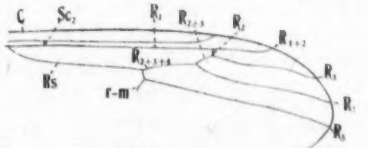

Fig. 2

Wing-venation of *Trichocera fernaldi* sp. n. Symbols: A–Anal veins; C–Costa; Cu–Cubitus; h–humeral crossvein; M–Media; R–Radius; r-m–radial-medial crossvein; Rs–Radial sector; Sc–Subcosta.

The second tendency of specialization in this field has been termed "the capture of vein R_4 by R_{2+3}." In the hypothetical type of insect and in generalized Diptera, the sector forks twice, dichotomously, the upper fork carrying veins R_2 and R_3, the lower, R_4 and R_5. In the groups in question, vein R_4 in different genera and species moves basad, shortening R_{4+5} until the latter is obliterated. Vein R_4 then moves cephalad along vein R_{2+3}, forming a short to longer fusion, R_{2+3+4} (Figs. 1, 2).

In the present paper, I have adopted the Comstock-Needham system of venation, as modified by Tillyard for the cubital field, and for the radial field as discussed above (Fig. 2). In order that the terminology of the Comstock-Needham system may be more readily correlated with the modification herein adopted, I have added a tabulation of all the veins and cells in the radial field.

Comstock-Needham Terminology	Terminology adopted in this paper.
Veins:	
R_1 (first section)	R_1 (first section)
R_1 (second section)	R_1 (second section)
R_1 (third section)	R_{1+2}
Rs	Rs
r	basal section of R_2
R_{2+3}	R_{2+3+4}
R_2 (first section)	R_{2+3}
R_2 (second section)	R_3
R_{4+5} (both sections)	R_5 (both sections)
Cells:	
1st R_1	R_1
2nd R_1	R_2
R_2	R_3
R_3	R_4
R_5	R_5

In the accompanying figure (Fig. 2), the first section of R_1 lies between the origin of Rs and Sc_2, the second section between Sc_2 and the basal section of R_2; R_{2+3+4} is between the fork of Rs and the point of departure of R_4; R_{2+3} between the latter point and R_2; R_3 beyond R_2. The other parts are self-explanatory.

The terminology of the male hypopygium used in this and other papers is that of Crampton (*Trans. Amer. Ent. Soc.*, 48: 207-225, 3 pls.; 1923).

Considerable use has been made of the macrotrichiae of the veins and the relative proportions of certain of the veins and deflections. It should be noted that both of these characters vary greatly and can be used only within restricted limits.

Trichocera setosivena, sp. n.

Male.—Length about 6 mm.; wing, 8.2 mm.

Rostrum and palpi dark, the terminal segment of the latter about one-third longer than the penultimate. Antennae with the scapal segments reddish brown, the flagellum dark brown. Head dark brown, paler in front.

Pronotal scutum dark brown, the scutellum conspicuously yellowish. Mesonotal praescutum light brown with four darker stripes, the intermediate pair darker brown, confluent in front but distinctly separated behind, the lateral stripes paler; scutum brownish gray, the lobes extensively dark brown, margined mesally with obscure yellow; scutellum dark, broadly and conspicuously margined with light yellow; postnotum light brown, the cephalic lateral portions of the mediotergite yellow. Pleura brown, somewhat darker dorsally to form a diffuse dorso-longitudinal stripe, the ventral portion of the pteropleurite paler. Halteres brown, the base of the stem paler. Legs with the coxae obscure yellow; trochanters yellow; femora brownish yellow, unmarked; tibiae and tarsi slightly darker brown.

Wings with a strong brownish tinge, somewhat more intense in the general region of the stigma and along vein Cu_1. Macrotrichiae of veins very long and abundant, about equal in length to the basal section of R_2; on vein *1st A* these trichiae occur the entire length of the vein, on vein *2nd A* on all but the distal third. Venation: Sc_1 elongate, a trifle shorter than Rs and about twice the first section of R_1, ending opposite the basal section of R_2; R_{1+2} about one-half the length of Rs; R_{2+3+4} short, about one-half R_{2+3}; cell M_1 very deep, about three times its petiole; *m-cu* sinuous, at the fork of M_{3+4}; vein *2nd A* relatively short.

Abdominal tergites dark brown, the caudal margins of the segments somewhat darker; basal sternites obscure yellow, the outer segments becoming more uniformly darkened; hypopygium dark-colored. Abdomen with conspicuous erect setae. Male hypopygium with the basistyles completely united ventrally, no trace of the suture being apparent. Dististyle simple, cylindrical, the armature of the mesal face very delicate, erect to weakly retrorse; no tubercles or other processes on dististyle. Phallosome a quadrangular plate, the caudo-lateral angles produced laterad and slightly caudad into relatively short, acute spines.

Hab. Alaska.

Holotype, ♂, Seward, July 26, 1921 (*J. M. Aldrich*); U.S.N.M.

This species and the next are well distinguished by the great length and abundance of the macrotrichiae of the wing-veins, which suggest the genus *Diazosma*. The structure of the male hypopygium requires detailed study. Even under a microscope, no trace of the suture separating the ventro-mesal lobes of the basistyle is apparent and the "bridge" so formed certainly appears to be complete. The phallosome also is different from all described species of the genus, with the exception of *T. major* Edwards, which has quite the same structure. In this latter species, however, the trichiae of the wings are short and normal for the genus.

Trichocera longisetosa, sp. n.

Male.—Length about 4 mm.; wing, 5.5 mm.

Generally similar and closely allied to the last, *T. setosivena*, sp. n., in the long, conspicuous macrotrichiae of the wing veins and the general structure of the hypopygium.

Size much smaller. Mesonotum of type more or less discolored, reddish, the humeral region more yellowish, with a broad median brown stripe; scutellum yellowish testaceous. Pleura and postnotum reddish, the dorso-pleural region and the sternopleurite darker. Legs obscure brownish yellow, the terminal segments of the tarsi darker. Wings with a brownish tinge, the veins and machrotrichiae darker. Macrotrichiae long and conspicuous, as in the last, those adjoining the basal section of R_2 about as long as this vein. Venation: Sc_1 relatively short, about three-fourths Rs, ending some distance before the basal section of R_2; R_{1+2} about two-fifths Rs; second section of R_1 and Rs subequal; R_{2+3+4} a little longer than R_{2+3}; R_2 sinuous; basal section of R_5 short; cell M_1 deep, about two and one-half times its petiole; cell *1st* M_2 with the inner end pointed; *m-cu* at fork of M_{3+4}.

Abdomen brown, including the hypopygium. Male hypopygium as in *T. setosivena* but with the lateral horns of the phallosome longer.

Hab. Washington.

Holotype, ♂, Lake Cushman, June 27, 1917 (*H. G. Dyar*); U.S.N.M.

Trichocera columbiana, sp. n.

Male.—Length about 5 mm.; wing, 6.5-7.4 mm.

Female.—Length about 7 mm.; wing, 8.5 mm.

Rostrum and palpi dark brown. Antennae with the scapal segments brownish yellow, the flagellum dark brown. Head dark brown or grayish brown.

Pronotum dark brown, the scutellum and anterior lateral pretergites restrictedly yellowish. Mesonotal praescutum reddish brown, with a broad dark brown median area that is sometimes weakly divided, the sides of the sclerite pale, sparsely dusted with gray; scutum reddish brown, the scutellum paling into yellowish; postnotum brownish yellow, darker behind. Pleura chiefly dark brown, especially dorsally, the posterior sclerites more reddish brown. Halteres pale, the knobs dark brown. Legs with the coxae light brownish yellow, in some cases the fore coxae with the outer face darker; femora brownish yellow, the bases clearer yellow; tibiae and tarsi passing into darker brown. Wings with a faint brownish tinge; a small and sometimes poorly defined dark suffusion on *r-m*; stigmal region in some cases a little darkened; veins dark brown. Macrotrichiae short and relatively sparse, more abundant and crowded on the outer veins of the radial field, longer and more conspicuous on the branches of M, especially M_{3+4}; very weakly developed on the veins basad of the level of the origin of *Rs*, there being none on the basal half or a little less of the first section of *Sc*, on about the basal third or fourth of *M*, the basal sixth of *1st A*; usually none on *2nd A*, in the cases where developed, very few in number and of considerable length. Venation: R_{1+2} about one-half *Rs* or a little less; first section of R_1 variable in length, from one-third to one-fifth the second section; R_{2+3+4} longer than R_{2+3}; R_3 gently sinuous, subequal to *Rs*; cell M_1 deep, more than twice its petiole; vein *2nd A* slightly extended.

Abdomen tergites dark brown, the basal sternites bicolorous, the bases of the segments extensively obscure yellow, the margins broadly dusky; the outer sternites are more uniformly infuscated; hypopygium yellowish to brownish yellow. Male hypopygium with the ventro-mesal extension of the basistyles very broad, meeting on the median line to form a wide bridge, the suture well preserved. Dististyle simple, relatively long, without tubercles. Gonapophyses appearing as long, broad-based blades. Ovipositor relatively narrow, yellow, from four to five times as long as wide.

Hab. British Columbia, Alaska.

Holotype, ♂, Prince Rupert, B. C., June 17, 1919 (*H. G. Dyar*); U. S. N. M.

Allotopotype, ♀, with type.

Paratopotypes, 7 ♂ ♀; *paratypes*, 1 ♂, Victoria, B.C., March 28, 1916 (*R. C. Treherne*), Can. Nat. Coll.; 1 ♂, March 8, 1920 (*W. B. Anderson*); 3 ♂ ♀, Metlakatla, B.C., November 9, 1908 (*J. H. Keen*), Can. Nat. Coll.; 1 ♀, Ketchikan, Alaska, June 20, 1910 (*H. G. Dyar*).

Trichocera fernaldi, sp. n.

Male.—Length, about 4.5 mm.; wing, 6.5-6.8 mm.

General coloration of head gray. Antennae dark brown, the apex of the second scapal segment paler.

Mesonotal praescutum dark brownish gray, with two darker brown intermediate stripes, the lateral stripes nearly obsolete; scutum dark brownish gray; scutellum dark gray, the caudal margin more reddish brown; postnotum dark gray. Pleura dark gray. Halteres pale, the knobs dark brown. Legs with the coxae and trochanters dark; femora yellowish brown, the tips narrowly infuscated; tibiae and tarsi darker brown. Wings grayish subhyaline, sparsely variegated with darker gray, including a seam at *r-m*, a spot below the origin of *Rs* in cell *R*; narrow seams on *m-cu* and outer end of cell 1*st* M_2 and a pale stigmal area beyond the basal section of R_2. Macrotrichiae of veins short and sparse, lacking on about the basal half of veins *M* and 1*st A*; 2*nd A* without trichiae, except in rare cases, when one or two may be present. Venation (Figs. 1 and 2): Sc_1 ending about opposite the short basal section of R_2; first section of R_1 short, only about one-sixth of the second section; R_{2+3+4} about two and one-half times R_{2+3}; R_3 sinuous, shorter than the second section of R_1; cell M_1 a little longer than its petiole.

Abdomen dark brownish black, the intermediate segments vaguely a little paler on basal half. Male hypopygium with the dististyle cylindrical, without basal tubercle. Gonapophyses elongate.

Hab. Massachusetts.

Holotype, ♂, Amherst, October 22, 1926 (*Alexander*).

Paratopotypes, 5 ♂ ♂; Alexander Coll.

In small swarms among shrubbery on north side of Fernald Hall. This species is named in honor of Prof. H. T. Fernald, to whom I am greatly indebted for many kindnesses and suggestions in the past. The fly is allied to *T. maculipennis* Meig. and *T. bimacula* Walk., in the heavily patterned wings. The former species is very distinct in the coloration of the legs, the femora being yellowish with a narrow subterminal brown ring; wings with cell R_3 deep, vein R_3 being nearly as long as the second section of R_1; macrotrichiae of veins more numerous, including a series on vein 2*nd A*; male hypopygium with a small basal tubercle on mesal face of dististyle. *T. bimacula* Walk. is described by both Walker and Edwards as having the abdomen conspicuously banded with brown and ochreous, a feature that at once separates it from the present species.

Trichocera garretti, sp. n.

Male.—Length about 4 mm.; wing, 6.2—6.5 mm.

Rostrum and palpi black. Antennae black, the distal segments of the flagellum a little paler. Head brownish black.

Mesonotum brownish black, without markings, the scutellum a trifle brighter. Pleura dark. Wings grayish; a broad dusky cloud on *r-m* and the large diffuse stigmal area pale but conspicuous; a paler brown seam along *Cu* and *m-cu*; veins dark brown. Macrotrichiae short and relatively sparse, lacking on about the basal fourth of *M*, basal sixth of 1*st A*, and usually none on 2*nd A*, when present, few in number and of considerable length. The venation of the medial field of the paratype is deformed. Venation: Sc_1 ending opposite the basal section of R_2; first section of R_1 from one-third to one-fourth the second section; R_{2+3+4} about one-third longer than R_{2+3}; cell M_1 about as deep as its petiole.

Abdomen brown, the caudal margins of the segments narrowly darker; hypopygium brownish black. Male hypopygium with the mesal extensions of the

basistyle large and broad, broadly contiguous along the median line. Dististyle with about the basal two-fifths much stouter than the narrowed distal portion, on the mesal face at the point of narrowing with a conspicuous flattened ear-shaped blade; mesal face of style beyond this blade densely set with dark setae that are longer and more conspicuous than usual in this genus, these becoming small and finally obsolete at apex; these setae surround the base of the ear-like lobe for a short distance basad of its origin. Gonapophyses forming elongate acicular blades.

Hab. British Columbia.

Holotype, ♂, Marysville, altitude 5500 feet, May 11, 1919 (*C. B. D. Garrett*); Alexander Coll.

Paratypes, ♂, Lillooet, May 3, 1916 (*Tom Wilson*); Can. Nat. Coll.; 5 ♂ ♂, Cranbrook, April 5, May 5, October 21, November 9, (*C. B. D. Garrett*).

The type of this very interesting fly was kindly given me some years ago by Mr. Garrett, after whom the species is named.

Trichocera salmani, sp. n.

Male.—Length about 4 mm.; wing, 5.2 mm.

Rostrum and palpi brownish black. Antennae brownish black throughout. Head dark brown.

Mesonotal praescutum dark grayish brown, without evident stripes or other markings, the remainder of the notum grayish brown. Pleura dark grayish brown. Halteres elongate, obscure testaceous, the knobs darkened. Legs with the coxae dark brown; trochanters dark; remainder of legs dark brown, the femoral bases only vaguely paler. Wings grayish subhyaline, only the oval stigma darker, pale brown; veins brownish black. Macrotrichiae of wing relatively short and sparse; none on basal half of Sc, on the distal half or a little less weakly present; Sc_1 similar, with the basal half virtually devoid of trichiae; none on *2nd A*. Venation: R_{2+3} about three times basal section of R_2 and about three-fourths as long as R_{2+3+4}; R_{1+2} a little more than one-half the second section of R_1; cell M_1 about one-half longer than its petiole; *m-cu* at the fork of M_{3+4}; vein *2nd A* very small.

Abdomen uniformly dark brown. Male hypopygium of very remarkable form. Tergite deeply emarginate, each lobe with a dense brush or stout pencil of reddish bristles that greatly exceed the lobes in length. Basistyles relatively small, apparently without mesal lobes. Dististyle greatly elongated, bifid, the basal portion stout, the long outer arm sinuous, a little expanded at tip, the apex with a group of conspicuous erect setae on inner face and a series of about eight longer setae arranged in a linear row down the distal third of the outer face; inner arm of dististyle, which represents the usual basal tubercle, produced into a long slender arm, the tip weakly expanded. Gonapophyses very elongate, gently curved.

Hab. Massachusetts.

Holotype, ♂, In laboratory, Fernald Hall, Amherst, January 22, 1927 (*K. A. Salman*); Alexander Coll.

This is quite the most remarkable species of *Trichocera* so far made known. It is named in honor of the collector, to whom I am indebted for numerous American and Salvadorean Tipulidae. The unique type was taken in the laboratory of Fernald Hall, during a mild spell of weather. Careful search out-of-doors within a

few minutes of the discovery of this fly resulted in the capture of another species of *Trichocera* but no more of the species in question.

ON THE IDENTITY OF SOME SPECIES OF CARTOSYRPHUS (DIPTERA).*

BY C. H. CURRAN,
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Shannon's "Revision of the Chilosinae" includes keys to the species of the various genera of the group but in some cases no descriptions of the new species are included. In the key to *Cartosyrphus* the characters separating some closely related species are difficult to interpret. The male of *C. similis* Shan. is separated from *tristis* Lw. by the slightly more swollen first segment of the posterior tarsi. While this character is quite satisfactory in the female it cannot be relied upon in the male. In order to verify observations made several years ago when I compared specimens with the types of the two species mentioned I wrote to Dr. Banks requesting information on the colour of the squamal cilia.

In *C. tristis* the squamae and their cilia are quite whitish while in *similis* the border of the squamae and the cilia are brownish. In some specimens this brown color is intense, but very rarely it is pale brown. However, the pale abdominal pile of *similis* is pale orange or reddish yellow while in *tristis* it has only a slight yellowish tinge, being pale cinereous.

C. longipilosa Wehr is very close to *similis* Shan. but the female has yellow spots on the face as in *tristis*. In the male the two species are extremely difficult to separate.

Cartosyrphus ontario Curran.

Chilosia ontario Curran, Can. Ent., liv, 191, 1922, (Nov.).
Chilosia rita Curran (Printer's error), Can. Ent., liv, 70, 1922, (May).
Cartosyrphus slossonae Shannon, Ins. Ins. Mens., X, 133, 1922, (Oct. 1.).

C. slossonae Shannon has been separated from *ontario* Curran by the presence of some marginal bristles on the scutellum of the latter. In the type of *ontario* there are three black bristles but in a series taken at Alymer, Que., there is considerable variation in this regard, some of the specimens entirely lacking them while others possess from one to four. It is therefore obvious that the two names apply to the same species.

A curious situation has arisen in regard to the nomenclature of this species owing to an obvious printer's error. In the final page proof of the article containing the description of *C. ontario* the heading was correct but when the issue appeared it had, in some inexplicable manner, become changed to *C. rita*, the same as the name of the species which followed. Owing to the fact that the type of *C. ontario*, as labelled in my collection, agreed with the description of the first species bearing the name *rita*, and the description could apply only to this species I proceeded to correct the error made by the printers and corrected the name to *ontario* to conform with the type and also the original manuscript.

In the interim between the publication of the two papers mentioned, Shannon's revision of the group appeared and he used the name *slossonae* for the form without distinct scutellar bristles. The dates of the three articles mentioned are given in the synonymy.

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

My action in changing the name of the first *C. rita* might be questioned but since it was an obvious error I felt justified in doing so, and still see no reason for any other course. The question which arises, if such a course is correct, is whether Shannon's name, *slossonae*, should have priority over the corrected name. An expression of opinion on the matter would be of interest.

However, if I was wrong in correcting the error and should have changed the name of the second *C. rita* we find that here too we have difficulties since Shannon has also described this species under a different name.

Cartosyrphus rita Curran.

Chilosia rita Curran, Can. Ent., liv, 71, 1922, (May).
Cartosyrphus sialia Shannon, Ins. Mens., X, 132, 1922, (Oct.).
Cartosyrphus rita Shannon, id, p. 135.

Shannon described the male as *sialia*, although it was only included in the key and no detailed description was given. There is no doubt about the synonymy. The acuteness of the apical cell is somewhat variable as is shown by a large series of specimens in the Canadian National Collection.

NOTE ON THE SYNONYMY OF ODONTOMERUS MELLIPES SAY (HYMENOPTERA, ICHNEUMONIDAE).*

BY G. S. WALLEY,
Ottawa, Ont.

Odontomerus mellipes Say.

Anomalon mellipes Say, Maclur. Lyc. Phila., II, 75, 1828.
Odontomerus canadensis Provancher, Nat. Can., II, 102, 1877.
Odontomerus errans Rohwer, Proc. U. S. Nat. Mus., XLV, 360, 1913.
Odontomerus mellipes Say, Rohwer, Proc. U. S. Nat. Mus, LVII, 458, 1921.
Odontomerus canadensis Provancher, Rohwer, Proc. U. S. Nat. Mus., LVII, 458, 1921.

From a study of a large series of specimens of *Odontomerus* it seems evident that *O. canadensis* Prov. is not separable from *O. mellipes* Say and the above synonymy is suggested. Some specimens agree very well with the characters given in Rohwer's key while others show a complete intergradation of characters and cannot be associated with either form. In some females the facial quadrangle is transverse and in others longer than wide. There are however specimens which intergrade between these two extremes making it impossible to establish any satisfactory line of demarkation. Similarly the carina of the first abdominal segment is variable. Some specimens have no carina evident while in others it is well defined and in still others it is abbreviated or poorly defined. Some female specimens have the facial quadrangle elongate but lack the carina; others have the facial quadrangle transverse and show a strong carina. The length of the ovipositor in the female and the color of the hind tibia in the male are also extremely variable characters. For these reasons it is obvious that *O. canadensis* Prov. must fall to *O. mellipes* Say.

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*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

Mailed Saturday, March 26th, 1927.

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